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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/802,361

03/08/2001

David J. Edlund

NPW 312

8306

7590

05/04/2007

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EXAMINER

HANDAL, KAITY V

ART UNIT

PAPER NUMBER

1764

MAIL DATE

DELIVERY MODE

05/04/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

09/802,361

Applicant(s)

EDLUND ET AL.

Examiner

Kaity Handal

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-32, 34-39 and 67-75 is/are rejected.
- 7) ☒ Claim(s) 40-42 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-15, 17-26, 35-39, 67-71, and 74-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bocard et al. (US 3,469,944) in view of Autenrieth et al. (US 6,447,736 B1).

With respect to claim 1, Bocard teaches hydrogen manufacturing apparatus (fig. 1) comprising a shell/housing (42) including at least one input/conduit (23) adapted to receive a feed stream containing a feedstock (col. 4, lines 33-36) and at least one output/conduit (41) adapted to emit a product hydrogen stream containing at least substantially pure hydrogen gas (col. 5, lines 19-23); a hydrogen-producing region/reformers (19 & 20) at least partially contained within the shell/housing (42) and adapted to receive the feed stream (23) and to produce a mixed gas stream (39) containing hydrogen gas and other gases therefrom (col. 5, lines 16-18 and 46-49); and a separation region/hydrogen purifier (40) adapted to receive the mixed gas stream (39) and to separate the mixed gas stream (39) into a hydrogen-rich stream (41) forming at least a substantial portion of the product hydrogen stream and

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containing at least substantially hydrogen gas and a byproduct stream (17)

containing at least substantially the other gases (col. 5, lines 55-59).

Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

With respect to claim 2, Bocard teaches wherein the modular component/(any of the operational units, for example the reformers (19 and 20)) is adapted to receive a gas-containing stream/feedstock (23) having a composition and to outlet a gas-containing stream/gaseous effluent (39) having a different composition/due to undergoing a reforming process.

Regarding limitations recited in claims 2 and 19 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions

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relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

With respect to claim 11, Bocard teaches wherein the hydrogen-producing region/reformers (19 & 20) is/are completely contained within the shell/housing (42) (as illustrated in figure 1).

With respect to claim 12, Bocard teaches wherein the hydrogen- producing region includes a reforming region (19 & 20) containing at least one reforming catalyst bed (col. 4, lines 28-33).

With respect to claim 14, Bocard teaches wherein at least a portion of the reforming region forms at least a substantial portion of the modular component (as illustrated in figure 1).

With respect to claims 3-10, 13 and 15, Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

With respect to claim 17, Bocard teaches wherein the separation region/hydrogen purifier (40) is at least partially contained within the shell/housing (42) (as illustrated in figure 1).

With respect to claim 18, Bocard teaches wherein the separation region/hydrogen purifier (40) is completely contained within the shell/housing (42) (as illustrated in figure 1).

With respect to claims 20 and 22, Bocard teaches wherein the separation region/hydrogen purifier (40) includes at least one/plurality of hydrogen-selective membrane/palladium diffusion cells (col. 5, lines 16-18)

With respect to claim 21, Bocard teaches wherein the modular component/apparatus (figure 1) includes the at least one hydrogen-selective membrane/palladium diffusion cell (col. 5, lines 16-23).

With respect to claim 23, Bocard teaches wherein the membrane module/hydrogen purifier (40) further includes a pair of end plates between which the hydrogen-selective membranes/palladium diffusion cells are mounted (as illustrated in figure 1).

With respect to claim 24, Bocard teaches wherein the membrane module/hydrogen purifier (40) includes at least one output port/conduit (17) through which the byproduct stream is removed from the membrane module/hydrogen purifier (40), and at least one output port/conduit (41) through which the hydrogen-rich stream is removed from the membrane module (col. 5, lines 50-59).

With respect to claim 25, Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

With respect to claim 26, Bocard teaches wherein at least a portion of the membrane module/hydrogen purifier (40) forms at least a substantial portion of the modular component/apparatus (as illustrated in figure 1).

With respect to claim 35, Bocard teaches wherein the fuel processor/apparatus further includes a purification region/methanator (43) adapted to receive the hydrogen-rich stream/conduit (41) and to reduce a concentration of selected components of the hydrogen-rich stream to form a product hydrogen stream (col. 5, lines 69-75).

With respect to claims 36-37, Bocard teaches wherein the modular component/apparatus (fig. 1) includes the purification region/methanator (43) (as illustrated in figure 1).

With respect to claim 38, Bocard teaches wherein the purification region/methanator (43) includes a methanation catalyst bed (col. 5, lines 69-75).

With respect to claim 39, Bocard teaches wherein the modular component/apparatus (fig. 1) includes the methanation catalyst bed/methanator (43) (as illustrated in figure 1).

With respect to claim 67, Bocard teaches wherein a fuel processor/hydrogen manufacturing apparatus (fig. 1) is adapted to produce hydrogen gas (41) from a feed stream/feedstock conduit (23) (illustrated).

With respect to claims 67-69, Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

With respect to claim 70, Bocard teaches wherein the at least one cartridge-based component/apparatus (fig. 1) includes a hydrogen-producing region/reformers (19 & 20) adapted to receive the feed stream/feedstock conduit (23) and produce a stream/conduit (41) containing hydrogen gas therefrom.

With respect to claim 71, Bocard teaches wherein the at least one cartridge-based component/apparatus (fig. 1) includes a separation region/hydrogen purifier (40) adapted to receive a mixed gas stream (39) containing hydrogen gas and other gases and to separate the mixed gas stream (17) into a hydrogen-rich stream (41) containing at least substantially hydrogen gas and a byproduct stream containing at least substantially the other gases (col. 5, lines 55-59).



With respect to claim 74, Bocard teaches wherein the at least one cartridge-based component/apparatus (fig. 1) includes a reforming region (19 & 20) containing a reforming catalyst and adapted to receive the feed stream (23) and to produce a mixed gas stream (39) containing hydrogen gas and other gases therefrom (col. 4, lines 28-29, and col. 5, lines 55-59).

With respect to claim 75, Bocard teaches wherein the at least one cartridge-based component/apparatus (fig. 1) includes a bed (19 & 20) containing a reforming catalyst (col. 4, lines 28-29).

3. Claims 27-32, 34 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bocard et al. (US 3,469,944) in view of Autenrieth et al. (US 6,447,736 B1), as applied to claims 1 and 67 above, and further in view of Farooque et al. (US 5,175,062).

With respect to claims 27-30, 32, 72, Bocard as modified discloses all claim limitations as set forth above but fails to show wherein the fuel processor/modular component/hydrogen producing apparatus (fig. 1) further includes a filter assembly adapted to remove particulate from the mixed gas stream. Farooque teaches a reformer (fig. 2) comprising a reforming unit housing (7A) which includes a filter assembly/material (7-25) adapted to remove particulate from the mixed gas stream as received from the reforming catalyst bed (illustrated) in order to prevent catalyst particulates from being blown out from the reforming bed (col. 5, lines 19-21).

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a filter assembly adapted to remove particulates from the mixed gas stream in Bocard's modified apparatus, as taught by Farooque, in order to prevent catalyst particulates from being blown out from the reforming bed.

With respect to claims 28, 31 and 34 25, Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

### ***Double Patenting***

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to

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be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claim 1 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,719,832 B2 in view of Autenrieth et al. (US 6,447,736 B1).

Although the conflicting claims are not identical, they are not patentably distinct from each other because: both claims claim a fuel processor comprising a shell/an enclosure including at least one input/adapted to receive a feed stream/mixed gas stream and at least one output/means for removing the at least one product stream adapted to emit a product hydrogen stream containing at least substantially pure hydrogen gas; a hydrogen-producing region adapted to receive the feed stream and to produce a mixed gas stream containing hydrogen gas and other gases therefrom; and a separation region/hydrogen selective membrane adapted to receive the mixed gas stream and to separate the mixed gas stream into a hydrogen-rich stream/product stream forming at least a substantial portion of the product hydrogen stream and containing at least substantially hydrogen gas and a byproduct stream.

Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

6. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/016,807 in view of Bocard et al. (US 3,469,944) and in view of Autenrieth et al. (US 6,447,736 B1).

Claim 1 of co-pending application claims: a fuel processor comprising: a hydrogen-producing region/reforming catalyst bed adapted to receive the feed stream and to produce a mixed gas stream containing hydrogen gas and other gases therefrom; and a separation region adapted to receive the mixed gas stream and to separate the mixed gas stream into a hydrogen-rich stream/product stream forming at least a substantial portion of the product hydrogen stream and containing at least substantially hydrogen gas and a byproduct stream.

Claim 1 of co-pending application (x807) does not show a shell. Bocard teaches all claim limitations including a shell/housing (fig. 1, 42) as a preferred practice in the art and in order to have a heat exchange relationship between the hydrogen producing region/reformer beds (19 & 20) and the separation region/hydrogen purifier (palladium cells) (40) (col. 5, lines 25-37).

It would have been obvious to one having an ordinary skill in the art at the time the invention was to include a shell/housing in co-pending application (x807), as taught by Bocard, as a preferred practice in the art and in order to have a heat exchange relationship between the hydrogen producing region/reformer beds.

While claim 1 of co-pending application (x807) does not explicitly claim said shell having an input and output, it would be necessary to have an input and output for receiving feedstock and releasing product gases respectively.

Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

This is a provisional obviousness-type double patenting rejection.

7. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 11/247,744 in view of Bocard et al. (US 3,469,944) in view of Autenrieth et al. (US 6,447,736 B1).

Claim 1 of co-pending application claims: a fuel processor comprising: a shell/enclosure, one input adapted to receive a feed stream and at least one output for removing the at least one product stream adapted to emit a product hydrogen stream containing at least substantially pure hydrogen gas; a hydrogen-producing region adapted to receive the feed stream and to produce a mixed gas stream containing hydrogen gas and other gases therefrom; and a separation region/hydrogen-selective membrane adapted to receive the mixed gas stream and to separate the mixed gas stream into a hydrogen-rich stream/permeate stream forming at least a substantial portion of the product hydrogen stream and containing at least substantially hydrogen gas and a byproduct stream.

Claim 1 of co-pending application (x744) does not claim wherein said hydrogen-producing region is within said shell. Bocard teaches all claim limitations including a shell/housing (fig. 1, 42) as a preferred practice in the art and in order to have a heat exchange relationship between the hydrogen producing region/reformer beds (19 & 20) and the separation region/hydrogen purifier (palladium cells) (40) (col. 5, lines 25-37).

It would have been obvious to one having an ordinary skill in the art at the time the invention was to include said hydrogen-producing region within said shell in co-pending application (x744), as taught by Bocard, as a preferred practice in the art and in order to have a heat exchange relationship between the hydrogen producing region/reformer beds and the separation region/hydrogen purifier.

Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

This is a provisional obviousness-type double patenting rejection.

8. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/989,907 in view of Autenrieth et al. (US 6,447,736 B1).

Although the conflicting claims are not identical, they are not patentably distinct from each other because: claim 1 of co-pending application claims: a fuel processor comprising: a shell, a hydrogen-producing region/reforming region adapted to receive the feed stream and to produce a mixed gas stream containing hydrogen gas and other gases therefrom; and a separation region/hydrogen purification module adapted to receive the mixed gas stream and to separate the mixed gas stream into a hydrogen-rich stream forming at least a substantial portion of the product hydrogen stream and containing at least substantially hydrogen gas and a byproduct stream.

While claim 1 of co-pending application (x907) does not explicitly claim said shell having an input and output, it would be necessary to have an input and output for receiving feedstock and releasing product gases respectively.

Bocard fails to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Allowable Subject Matter***

Claims 40-42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The combination of having a second reformer within the purification region positioned downstream of the separation region and upstream of the methanation region is missing in the prior art of record.



### ***Response to Arguments***

#### **Prior Art Rejection**

Applicant argues that reference made to *In re Dulberg* does not provide that making components of a device separable is not an analogous art. Examiner respectfully agrees, however, reference to prior art is made in support of the key point that making components of a device separable is well known in the art as set forth above.

With respect to Bocard failing to teach that previously recited structural elements and connections are detachable. Autenrieth teaches a reforming apparatus comprised of modules in order to promote a flexible modular construction of the reactor unit (col. 2, lines 56-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Bocard comprised of modules, as taught by Autenrieth, in order to promote a flexible modular construction of the reactor unit.

Applicant indicated that both US patents 6,383,670 and 6,221,117 are disqualified from being used as references. Examiner withdrew the rejections made using these patents.

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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KH

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4/25/2007

  
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